U.S. House Committee on Resources

Kyoto Global Warming Treaty's Impact on Ohio's Coal Dependent Communities

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I am John Christy, Professor of Atmospheric Science and Director of the Earth System Science Center at the University of Alabama in Huntsville or UAH. I am also Alabama's State Climatologist and recently served as a Lead Author of the U.N.'s Intergovernmental Panel on Climate Change.

CARBON DIOXIDE

The concentration of carbon dioxide (CO2) is increasing in the atmosphere due primarily to the combustion of fossil fuels. Fortunately (because we produce so much of it) CO2 is not a pollutant. In simple terms, CO2 is the lifeblood of the planet. The vegetation we see around us would disappear if not for atmospheric CO2. This green world largely evolved during a period when the atmospheric CO2 concentration was many times what it is today. Indeed, numerous studies indicate the present biosphere is being invigorated by the human-induced rise of CO2. In and of itself, therefore, the increasing concentration of CO2 does not pose a toxic risk to the planet. In other words, carbon dioxide means life itself. CO2 is not a pollutant.

As an aside, it is clear that other emissions may be called pollutants, e.g. sulfur oxides, nitrogen oxides and mercury. Controlling these is a completely separate issue from controlling emissions of CO2 and so will not be discussed here.

It is the secondary impact of increasing CO2 that may present challenges to human life in the future. It has been proposed that CO2 increases could cause climate change of a magnitude beyond what naturally occurs in the climate system so that costly adaptation or significant ecological stress might occur. For example, enhanced sea level rise and/or reduced rainfall would be two possible effects likely to be costly to those regions so affected. Data from the past and projections from climate models are employed to provide insight on these concerns.

CLIMATE MODELS

Will increases in CO2 affect the climate significantly? Are significant changes occurring now? Climate models suggest the answer is yes, real data suggests otherwise.

Climate models attempt to describe the ocean/atmospheric system with equations which approximate the processes of nature. No model is perfect because the natural system is incredibly complex. One modest goal of model simulations is to describe and predict the evolution of the ocean/atmospheric system in a way that is useful to discover possible environmental hazards which lie ahead. The goal is not to achieve a perfect forecast for every type of weather in every unique geographic region, but to provide information on changes in large-scale features. If in testing models one finds conflict with even the observed large scale features, this would suggest that at least some fundamental processes, for example heat transfer, are not adequately described in the models.

A common feature of climate model projections with CO2 increases is a rise in the global surface temperature as well as an even more rapid rise in the layer up to 30,000 feet called the troposphere.

Over the past 24+ years various calculations of surface temperature indeed show a rise of about 0.7 °F. This is roughly half of the total rise observed since the 19th century. In the lower troposphere, however, various estimates which include the satellite data Dr. Roy Spencer of UAH and I produce, show much less warming, about 0.3 °F – an amount less than half that observed at the surface. The real world shows less

warming in the atmosphere, not more as models predict. Are these data reliable?

A new version of the microwave satellite data has been produced, but not yet published, by Remote Sensing Systems or RSS of California. Two weeks ago a paper was published in Science magazine' electronic edition which used a curious means of testing our UAH version against RSS.[1] The paper cited climate model results which agreed more with RSS, because RSS data showed about 0.4°F more warming than UAH's data for this same layer called the mid-troposphere. UAH's total warming for this layer was about 0.05°F. (This layer is higher in the atmosphere than the lower troposphere mentioned earlier with its 0.7°F warming.) The strong implication of the paper was that since RSS was more consistent with the model output, it was likely a more accurate dataset than ours.

That same week, with much less fanfare, my latest paper appeared in the Journal of Atmospheric and Oceanic Technology.[2] Unlike the paper in Science magazine, I performed several rigorous tests to estimate the potential error of our UAH satellite data. I used real observations from balloon datasets created by independent organizations, some with data from as many as 400 different balloon stations. Our UAH satellite data and the balloon data corroborated each other with remarkable consistency, showing only a slow warming of the bulk of the atmosphere. This evidence indicates that the projected warming of the climate model had little consistency with the real world. This is important because the quantity examined here, lower tropospheric temperature, is not a minor aspect of the climate system. This represents most of the bulk mass of the atmosphere, and hence the climate system. The inability of climate models to achieve consistency on this scale is a serious shortcoming and suggests projections from such models be viewed with great skepticism.

Changes in surface temperature have also been a topic of controversy. The conclusion in IPCC 2001 that human induced global warming was clearly evident was partly based on a depiction of the Northern Hemisphere temperature since 1000 A.D. This depiction showed little change until about 1850, then contains a sharp upward rise, suggesting that recent warming was dramatic and linked to human effects.[3] Since IPCC 2001, two important papers have shown something else.[4] Using a wider range of information from new sources these studies now indicate large temperature swings have been common in the past 1000 years and that temperatures warmer than today's were common in 50-year periods about 1000 years ago. These studies suggest that the climate we see today is not unusual at all.

WEATHER EXTREMES AND CLIMATE CHANGE

I want to encourage the committee to be suspicious of media reports in which weather extremes are given as proof of human-induced climate change. Weather extremes occur somewhere all the time. For example, in the year 2000 the 48 conterminous states, the U.S. experienced the coldest combined November and December in 106 years. We've just again witnessed a colder than average winter in the Eastern US with some record snowfalls here and there, while the California mountains had one of the coldest and snowiest April's ever. However, looking at these events does not prove the country is experiencing global cooling any more than a hot July represents global warming.

Has hot weather occurred before in the US? In my region of Alabama, the 19 hottest summers of the past 108 years occurred prior to 1955. In the midwest, of the 10 worst heatwaves, only two have occurred since 1970, and they placed 7th and 8th. Hot weather has happened before and will happen again. Such events do not prove climate change is occurring.

Similar findings appear from an examination of destructive weather events. The intensity and frequency of hurricanes have not increased. The intensity and frequency of tornadoes have not increased. The same is true for thunderstorms and hail. (Let me quickly add that we now have more people and much more wealth in the paths of these destructive events so that the losses have certainly risen, but that is not due to climate change but to progress.) Droughts and wet spells have not statistically increased or decreased. In a paper published last year I demonstrated from a rigorously constructed temperature dataset for North Alabama that summer temperatures there have actually declined since the 19th century.[5] Similar results have been found within states from California to Georgia.

One century is a relatively short time in terms of climate time scales. When looking at proxy records of the last 2000 years for drought in the Southwest, the record suggests the worst droughts occurred prior to 1600. The dust bowl of the 1930's appears as a minor event on such a time scale. This should be a warning that with or without any human influence on climate we should be prepared for a significant, multi-year drought. (Low cost energy would help mitigate the costs of transporting water to the stricken areas.)

When considering information such as indicated above, one finds it difficult to conclude the climate change is occurring in the US and that it is exceedingly difficult to conclude that part of that change might have been caused by human factors.

In the past 150 years, sea level has risen at a rate of 6 in. ± 4 in. (15 cm ± 10 cm) per century and is apparently not accelerating. Sea level also rose in the 17th and 18th centuries, obviously due to natural causes, but not as much. Sea level has been rising naturally for thousands of years (about 2 in. per century in the past 6,000 years). If we look at ice volumes of past interglacial periods and realize how slow ice responds to climate, we know that in the current interglacial period (which began about 11,000 years ago) there is still more land ice available for melting, implying continued sea level rise with or without climate change.

One of my duties in the office of the State Climatologist is to inform developers and industries of the potential climate risks and rewards in Alabama. I am very frank in pointing out the dangers of beach front property along the Gulf Coast. A sea level rise of 6 in. over 100 years, or even 50 years is minuscule compared with the storm surge of a powerful hurricane like Fredrick or Camille. Coastal areas threatened today will be threatened in the future. The sea level rise, which will continue, will be very slow and thus give decades of opportunity for adaptation, if one is able to survive the storms.

The main point I stress to state and local agencies as well as industries is that they invest today in infrastructure that can withstand the severe weather events that we know are going to continue. These investments include extending flood way easements, improvements in storm water drainage systems and avoiding hurricane-prone coastal development, among other actions. There are ways to reduce our vulnerabilities (i.e. enhancing our resilience) by increasing the investment today in the proper infrastructure or by avoiding future disasters with common sense building regulations. Our economy is affected much more by these extreme events which arrive every few years or decades versus whatever slow changes may occur due to human-induced climate change. The economic payoff would be tangible for such investments. The payoff for restricting energy use and economic activity for an unknown (and likely unknowable) future based on climate change scenarios is much less profitable for all concerned.

KYOTO'S IMPACT ON CLIMATE AND ECONOMY

One week ago today, the BBC published a report noting that the European Union has again exceeded their annual carbon dioxide targets under the Kyoto agreement. So in countries with apparently strong motivation for reducing carbon dioxide the treaty is failing. But that really is not a problem. (Under the Kyoto Treaty the U.S. was asked to reduced CO2 emissions 7% below 1990 levels.)

There have been many proposals to reduce CO2 emissions, some in this country, both more and less harsh than the Kyoto Protocol. In one way or another, each proposal seeks to limit energy usage through direct or indirect increases of the cost over market prices. A fundamental fact that our nation needs to understand is that any of these proposals if implemented, will have an effect on the climate so small that we would not be able to detect it. This is something I can speak to as my work focuses on precise measures of climate quantities. The evidence convinces me that none of these proposals would change to a noticeable degree whatever the climate is going to do. Raising the cost of energy with no detectable result generally falls into the category of a waste of American income.

I am decidedly an optimist about this situation. Our country is often criticized for producing 25% of the world's anthropogenic CO2. However, we are rarely recognized and applauded for producing, with that same CO2, 31% of what the world wants and needs; it's food, technology, medical advances, defense of freedom, and so on.[6] Today this is done primarily with the burning of carbon, but in the future will come from other inexpensive and efficient sources. For example, the US produces a unit of GDP using about 55% of the energy required to produce the same unit in 1970. The U.S. is decarbonizing its economy and this will continue. Even though carbon dioxide is not a pollutant, and energy from carbon allows people to live better lives, we can look forward to new sources of energy as the genius of America works on the next source of inexpensive energy.

I often mention that early in my career I served as a missionary in Africa. I lived upcountry with people who did not have access to useful energy. Put simply, access to energy means life, it means a longer and better life. I watched as women walked in the early morning to the forest edge, often several miles away, to chop wet green wood for fuel. They became beasts of burden as they carried the wood on their backs on the

return trip home. Wood and dung are terrible sources of energy, with low useful output while creating high pollution levels. Burning wood and dung inside the homes for cooking and heat created a dangerously polluted indoor atmosphere for the family. I always thought that if each home could be fitted with an electric light bulb and a microwave oven electrified by a coal-fired power plant, several good things would happen. The women would be freed to work on other more productive pursuits, the indoor air would be much cleaner so health would improve, food could be prepared more safely, there would be light for reading and advancement, information through television or radio would be received, and the forest with its beautiful ecosystem could be saved. Access to inexpensive, efficient energy would enhance the lives of the Africans while at the same time enhance the environment.

There are parallels in this country. Any of the proposals to reduce energy consumption by mandate (promoted in the state legislatures and the congress) would do nothing measurable to reduce the climate impacts of CO2. However, they would cause increases in energy costs (i.e. taxes). These additional taxes would fall disproportionately on the poor, who buy gasoline and home-heating at the same rate as everyone else. Their lives would be made more precarious as a result.

In Hearings such as this we are often asked at the close, “If you were a congressman for a day, what would you do on this issue? “ My answer is two fold. First, I would do no harm, I would not force energy prices up and thereby hurt the U.S. economy in general and the poor in particular.[7] Second, I would help America do what the innovative people of this nation do the best, help scientists and engineers discover the next source of low carbon energy, while building up our resilience to weather events, like floods, droughts, tornadoes, hurricanes that we know are going to continue, climate change or not.

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[1] Santer, B., et al., 2003. Influence of Satellite Data Uncertainties on the Detection of Externally-Forced Climate Change. ScienceExpress, 10.1126/science.1082393

[2] Christy, J.R. et al., 2003. Error estimates of Version 5.0 of MSU-AMSU bulk atmospheric temperatures. Journal of Atmospheric and Oceanic Technology, 20:613-629.

[3] Mann, M.E., R. S. Bradley, and M.K. Hughes, 1999: Northern Hemisphere temperatures during the past millennium: Inferences, uncertanties, and limitations. Geophys. Res. Lett., 26, 759-762.

[4] Soon, W. and S. Baliunas, 2003: Proxy climatic and environmental changes of the past 1000 years. Clim. Res., 23, 89-110. Esper, J. E.R. Cook, F.H. Schweingruber, 2002: Low-frequency signals in long tree-ring chronologies for reconstructing past temperature variability. Science 295, 2250-2253.

[5] Christy, J.R., 2002: When was the hottest summer? A State Climatologist struggles for an answer. Bull. Amer. Meteor. Soc. 83, 723-734.

[6] World Development Indicators, World Bank 2001 (for year 2000), US is $9,388B, World is $31,337B.

[7] Energy Information Administration, Impacts of the Kyoto Protocol on U.S. Energy and Economic Activity (Washington D.C.: U.S. Department of Energy), http://www.eia.doe.gov/neic/press/press109.html. Costs estimated for a reduction of CO2 by 3 % (not Kyoto’s 7 %) below 1990 emissions are between $125 and $280 billion per year of an economy of $9,425 billion, or about 1 to 3 %.